

REMARKS

Claims 1-19 are pending in the present application. Claims 1-9, 12-15 and 17-19 were rejected under 35 U.S.C. §103(a) as being unpatentable over Yoshioka et al., U.S. Patent No. 6,035,053. Claims 10-11 were rejected under 35 U.S.C. §103(a) as being unpatentable over Yoshioka et al. in view of Nishio, U.S. Patent No. 5,541,590. Claim 16 was indicated as being allowable if rewritten.

Reconsideration of the application is respectfully requested.

Rejection under 35 U.S.C. §103(a) to claims 1-9, 12-15 and 17-19

Claims 1-9, 12-15 and 17-19 were rejected under 35 U.S.C. §103(a) as being unpatentable over Yoshioka et al.

Yoshioka et al. describes a moving subject recognition system for a vehicle with a laser radar 2 and a CCD video camera 3 connected to an ECU 1. The ECU 1 performs image processing of a video image provided by the CCD video camera 3 and generates data variables or road conditions. A subject recognition process step S2, which includes determining the subject type and the distance LN between the vehicle and the subject, is performed based on echo data from the laser radar 2. See Yoshioka et al., col. 4, lines 20-39, and Fig. 1.

Claim 1 of the present application recites a three step process including:  
identifying regions within a two-dimensional camera image using a classifier designed for detecting road users and obstacles;  
marking and ranging, in a subsequent step, the identified regions using a distance-measuring sensor with respect to their distance from the observer; and  
subsequently type classifying the identified regions using a type classifier.

As recited in claim 1, only after the marking and ranging step are the identified regions type classified. Performing the type classification function may thus depend on the results of the ranging step. For example, the type classification can be dispensed with for objects determined in the ranging step to be distant and therefore less dangerous.

In contrast, Yoshioka et al. does not disclose or suggest type classifying subsequent to ranging. Rather, in Yoshioka et al. the subject type and range are determined together in one step S2 based on the radar echo data. See Yoshioka et al., col. 4, lines 29-39. Yoshioka et al. thus does not provide certain advantages of the claimed invention. For example, since in the claimed invention type classification occurs only after ranging of an object is performed, the sensor used for ranging is not used for classifying and therefore need not be equipped with extreme angular resolutions nor with robust models requiring substantial computational power, as discussed in the present specification at paragraph [0017]. Since it is not used for classifying, the ranging sensor may perform its ranging function quickly. Additionally, since in the claimed invention ranging occurs prior to type classification, a selection of regions may be performed so that only regions which meet a specific range criteria are fed to the type classifier, as discussed in the present specification at paragraph [0020]. In this way, computational load on the type classifier may be minimized and overall system speed enhanced.

Withdrawal of the rejection to claim 1 and its dependent claims 2-9 and 12-14 is respectfully requested.

Claim 15 of the present application recites a device including:

- a distance-measuring sensor unit;
- a mono-image camera coupled to the distance-measuring sensor unit;
- a first classifying unit interposed between the sensor unit and the camera; and
- a second classifying unit downstream from the sensor unit and the camera.

Thus, the first classifying unit is interposed between the camera and the sensor unit, and the second is located downstream from the sensor unit and camera. Thus the first classifying unit can receive data solely from the camera and output it to the sensor unit, and the second classifying unit can receive data from both the camera and the sensor unit.

Yoshioka et al. does not disclose or suggest a first classifying unit interposed between the distance sensor unit and the camera, and a second classifying unit downstream from the

sensor unit and the camera, but rather discloses a single control unit ECU 1 receiving inputs from both the laser radar 2 and the CCD 3. The outstanding office action indicates that the first classifying unit is met by processed images data of variables of the road conditions—this image processing occurs in control unit ECU 1. The outstanding office action also indicates that the second classifying unit is met by the subject recognition (step S2)—this recognition process also occurs in control unit ECU 1. Thus the office action indicates that the recited two classifying units are met by the single control unit ECU 1 of Yoshioka et al. However, the limitations of claim 15 require separate positioning of the two units. Specifically, claim 15 requires that the first classifying unit is interposed between the camera and the sensor unit, and the second is located downstream from the sensor unit and camera. Yoshioka et al. does not disclose placing the first classifying unit in between the distance sensor and the camera and the second classifying unit downstream from a sensor unit and a camera. In fact Yoshioka et al. teaches that the single control unit ECU 1 that performs the first and second classifications is positioned downstream of both the sensor unit and the camera. As indicated by the Examiner, the subject recognition step S2 of Yoshioka et al. is downstream from the radar unit and the camera. Yoshioka et al. thus teaches away from placing the two classifying units in different locations as recited in claim 15.

Withdrawal of the rejection to claim 15 and its dependent claims 17-19 is respectfully requested

Rejection under 35 U.S.C. §103 (a) to claims 10-11

Claims 10-11 were rejected under 35 U.S.C. §103(a) as being unpatentable over Yoshioka et al. in view of Nishio, U.S. Patent No. 5,541,590.

As discussed above relative to the rejection of claim 1, Yoshioka et al. does not disclose or suggest type classifying subsequent to ranging, as claimed in claim 1. Nishio also does not disclose or suggest at least this feature of claim 1. It is thus respectfully submitted that one of skill in the art would not have combined the Yoshioka et al. and Nishio references to provide “marking and ranging, in a subsequent step, the identified regions using a distance-measuring sensor with respect to their distance from the observer” and “subsequently type classifying the identified regions using a type classifier,” as recited in claim 1, as neither Yoshioka et al. nor Nishio shows this feature

Withdrawal of the rejection of claims 10-11 is respectfully requested.

Allowable subject matter


Claim 16 was indicated as being allowable if rewritten in independent form. Applicants thank the Examiner for this indication of allowability, but respectfully decline to amend claim 16 at this time pending the Examiner's reconsideration of claim 15.

CONCLUSION

It is respectfully submitted that the application is now in condition for allowance.

Respectfully submitted,

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